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Investigating the effect of carbon tax on production and employment and comparing with fuel tax in the industry sector

Mahbubeh Sheikhpour*, Hamid Reza Mirzaei Khalil Abadi**, Sedigheh Nabieyan***, Mohammad Reza Zare Mehrjerdi****

** Ph.D Student of Production And Management Economics of Agricultural Units, Department of Agricultural Economics, Shahid Bahonar University of Kerman, Kerman, Islamic Republic of Iran. (Corresponding Author)*
***Email**: sheikhpour@agr.uk.ac.ir*

0000-0003-3451-9022
***Postal address**: Pajoohesh Sq., Shahid Bahonar University, Kerman, Postal code:7616913439 , Iran.*

*** Associate Professor of Agricultural Economics, Department of Agricultural Economics, Faculty of Agricultural Economics, Shahid Bahonar University of Kerman, Kerman, Iran.*
***Email**: mirzaei_h@uk.ac.ir*
**** Assistant Professor of Agricultural Economics, Department of Agricultural Economics, Faculty of Agricultural Economics, Shahid Bahonar University of Kerman, Kerman, Iran.*
***Email**: snabieian@uk.ac.ir*
*** Professor of Agricultural Economics, Department of Agricultural Economics, Faculty of Agricultural Economics, Shahid Bahonar University of Kerman, Kerman, Iran.*
***Email**: zare@uk.ac.ir*

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EXTENDED ABSTRACT

INTRODUCTION

Today, environmental pollution has become one of the main management problems of countries. The experience of developed countries shows that incorrect use of the environment is so that excessive consumption of natural resources destroys the environment. Carbon tax is the imposed price on the consumption of carbon-containing fuels (coal, natural gas and other products). Carbon tax is the external costs of emitting pollutants, which are caused by the consumption of fossil fuels, are included in the price of fuel. In addition, it is a policy tool that helps the government reduce greenhouse gas emissions. The government's goal of implementing a carbon tax policy affects the food supply, as a result exacerbating unemployment and food insecurity in the country, and implement of carbon tax leads to loss of welfare.
Therefore, the main question that this article seeks to answer is the effect of carbon tax on production and employment in Iran's industrial sector. A review of the studies shows that there is no study that specifically examines the impact of carbon taxe on production and employment in the industrial sector by using the input-output method. This study also examines the comparison

between fuel tax and carbon tax as well as their effectiveness. In other words, in this study, the effect of carbon tax on production and employment in industrial sector of Iran has been investigated using two strategies, fuel tax and carbon emission tax, and the effectiveness of each strategy.

METHODOLOGY

Input-output tables provide a tool that shows the interrelationships between economic activities by economic sectors. The sample model used for this study is formulated from a static input-output model. The model can be expressed as follows:

$x = Ax + y$ *(1)*

$x = (I - A)^{-1} y$ *(2)*

A is the matrix of technical coefficients, x is the gross production vector, y is Exogenous final demand vector and $(\mathrm{I} - \mathrm{A})^{-1}$ is the Leontief inverse matrix that shows the direct and indirect effects of production.

In relation (3), P is the price vector, A' is a transposition matrix of technical coefficients A and $\bar{y}$ is the vector of production and import tax coefficients.

$P = (I - A')^{-1} (\bar{y})$ *(3)*

Equation (3) After decomposing $\bar{y}$ to services compensation w, the operating surplus r and the net indirect taxes t will be:

$P = (I - A')^{-1} (w + r + t)$ *(4)*

In the input-output table, from the division of employment of each sector to the output of total sector, the employment coefficient (direct employment) is obtained. The employment coefficient means how many jobs are needed per unit of production in section i.

The inverse employment matrix (L) is obtained by multiplying the employment coefficient matrix in the Leontief inverse matrix.

$L = e(I - A)^{-1}$ (5)

Multiplying the inverse employment matrix at the final demand vector, the potential power of different sectors of the economy is calculated, In other words, we will have:

$P = L.F$ (6)

In this study, according to the studies done and government behavior in the foretime, the carbon tax rate (carbon emission tax rate is simulated which will cause a ten percent reduction in carbon emissions) and the fuel tax(percentage

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increase in fuel prices that leads to a ten percent reduction in carbon emissions) is considered 10%. Also, to achieve the objectives of this research, the updated input-output table of 2018 and statistics and information of the statistics center and the ministry of energy have been used.

FINDINGS

The results show that carbon tax in industrial activities, reduces production and employment in this sector in the short run. Also, imposing fuel tax (increasing prices for Petrol, kerosene, Gasoline, Furnace oil, electricity, natural gas and liquefied gas) will increase the price of products in the industrial sector. In other words, in this study, by calculating the average fueles price elasticities, the effect of fuel tax and carbon tax on fuel consumption and carbon emission was investigated and compared in the industry for 2018. The results showed that the effect of fuel tax is more than the carbon tax.

CONCLUSION

The results of this study show that by imposing a tax on carbon, the highest reduction were in production and employment in the activities of (iron and steel, copper and aluminum, other metals) and (chemicals and pharmaceuticals) due to the need for high energy. The lowest reduction of production and employment were in the activities of (leather and shoes), (furniture, other products and repair and installation of machinery) and (production of electrical equipment). Also, with the imposition of fuel tax, there was the highest percentage increase in the price level in the activity of refineries and non-refineries, and the lowest percentage increase in the price level in the activity of clothing production. Carbon emission tax reduces energy consumption in industrial activities By motivating innovation in production technology in the long run, it will lead to the use of fuels with less pollution. Also, the carbon tax can provide the use of clean energy for the industrial sector in the presence of government facilities.

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